

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

FACT SHEET
(Pursuant to NAC 445A.874)

DRAFT

Permittee Name: **Pioneer Americas LLC and Montrose Chemical Corporation of California**
Project Name: **Henderson Groundwater Treatment System**
Address: **303 Warm Springs Road, Henderson, Nevada. Injection wells are in NE ¼ of NE ¼ of Section 11, T22S, R62E, MDB&M, Clark County**
Permit Action: **Temporary UIC Permit** Type of Project: **Remediation**
Permit Number: **UNEV2007200** Injection Wells (#): **Three (3)**

A. Description of Injection

Location: The effluent from the Henderson Groundwater Treatment System (GWTS) is injected into three subsurface fluid distribution systems (trenches) which are located south of Warm Springs Road. The three trenches are identified as Center Trench, New East Trench, and New West Trench. Once the trenches are in compliance with UIC regulations, the Class IV designation changes to Class V Injection Wells. Pioneer Americas LLC is the operator of the GWTS on behalf of Pioneer Americas LLC, Montrose Chemical Company of California, and Stauffer Management Company, LLC (hereafter the three companies will be referred to as “the Companies”) in Henderson, Nevada. The GWTS straddles real property owned by Basic Remediation Company and Tronox LLC. There are two unrecorded easements from the predecessors of these two companies that were granted to the predecessor of Pioneer Americas LLC. Pioneer Americas also owns 7 acres of land near the GWTS. The injection trenches have 3-4” pipe that is 6-7 ft. below ground surface (bgs). Injection into the trenches is by gravity flow.

Latitude: 36° 3' 14" N
Longitude: 115° 0' 4" W

Characteristics:

The injectate is effluent from the GWTS that has been treated to remove the following compounds mandated by the 1983 Consent Order:

- Eight organic chemicals: chloroform; benzene; dimethyldisulfide; chlorobenzene or monochlorobenzene (MCB); 1,3-dichlorobenzene (m-); 1,4-dichlorobenzene (p-); 1,2,4-trichlorobenzene; and 1,2-dichlorobenzene (o-);
- p-chlorothioanisole or 4-chlorophenyl methyl sulfide;
- Five organic acids: dimethylphosphorodithioic acid (DMPT), diethylphosphorodithioic acid (DEPT), phthalic acid, monochlorobenzenesulfonic acid (MCBS) or p-chlorobenzenesulfonic acid (4-), benzenesulfonic acid; and
- 2 pesticides (phosmet and carbophenothion).

Currently, the GWTS effluent does not meet Federal and State Primary Drinking Water Standards and State Action Levels, the GWTS does not contain the plume of contaminants and is impacting downgradient compliance monitoring wells. The GWTS shall be redesigned and upgraded to meet regulatory standards and requirements and contain the plume of contaminants according to the following Schedule of Compliance:

Effective upon issuance of this permit, sample compositing shall not occur. (Note: sample compositing is when different samples are combined into one sample. The action of combining samples allows exposure to air, which in the case of Volatile Organic Compounds (VOCs) potentially allows the sample to volatilize, thus potentially decreasing the concentration.)

By December 3, 2006, provide a proposal for two downgradient and one upgradient compliance monitoring transects to the Nevada Division of Environmental Protection (the “Division” or NDEP) Bureau of Corrective Actions (BCA) and the UIC Program.

The first downgradient compliance monitoring transect shall be located between the existing injection trenches and Warm Springs Road. This transect shall originate near well H-25 to the west and terminate near well H-52 to the east. This transect shall be approximately parallel to the line of extraction wells. The NDEP requires that a sampling point be placed approximately every 100’ along this transect. This may require the installation of additional wells or piezometers.

The second downgradient compliance monitoring transect shall be located further north and approximately parallel to the injection trenches. This transect shall include existing wells H-49A and H-56A. Two additional wells and/or piezometers shall be placed to the east of well H-49A and west of well H-56A at 100’ intervals, for a total of four new locations for this transect. In addition, a new monitoring well or piezometer shall be located between wells H-49A and H-56A (approximately equidistant, well H-58A may be suitable). If existing wells or piezometers are found to be suitable these can be used.

The upgradient monitoring transect wells shall be capable of monitoring the quality of water in the plume of contaminants immediately upgradient of the containment area. Please note that if any piezometers are proposed for use as monitoring wells, the Companies must demonstrate that the piezometers were constructed in a manner that will provide a representative sample.

By February 3, 2007, install a physical intercept wall and/or additional extraction wells to enable effective containment and capture of the plume of contaminants along the transect initially defined by the vertical area along the existing transect between extraction well “A” and extraction well “I” and the lower boundary of the alluvial aquifer. The lower boundary of the alluvial aquifer includes the saturated portion of the Muddy Creek Formation.

This initially defined transect shall be refined no later than 60 days after the effective date of this Permit to develop the three-dimensional target capture zone in accordance with the guidelines in Section C of *Elements for Effective Management of Operating Pump and Treat Systems*, EPA 542-R-02-009, December 2002. The development of the target capture zone must be resolved with the NDEP’s Bureau of Corrective Actions to comply with the Schedule of Compliance.

The system must be able to demonstrate effective mass removal for contaminants passing through the target capture zone. This will be accomplished by evaluating the actual capture zone. The actual capture zone will be defined as the three-dimensional zone in which all ground water flow paths converge to the extraction points. At least three converging lines of evidence are required to prove the effectiveness of capture on a quarterly basis. Potential lines of evidence may include:

- calculations of capture zone width based on flow budget and/or analytical models
- demonstrating overlapping cones of depression by interpretation of ground water flow lines from potentiometric surface maps and flow nets (for vertical capture)

- demonstration) that are based on measured ground water elevations in the alluvial aquifer including the saturated portion of the Muddy Creek Formation,
- inward flow relative to compliance boundary, based on measured ground water elevations at two or more locations oriented perpendicular to the boundary,
 - concentration trends over time at sentinel wells located downgradient of the capture zone,
 - particle tracking in conjunction with a numerical ground water flow model calibrated/verified by actual ground water elevations under flow conditions,
 - implementation and analysis of data from tracer tests.

By February 3, 2007, install a permanent physical barrier (above ground level) around each trench and install signage to prevent vehicular traffic.

By February 3, 2007, the air vents for the trenches shall be piped to an appropriate collection device (e.g., a sump). Water collected from these vents must be appropriately treated and disposed of.

By May 3, 2007, submit plans and specifications for upgrading the GWTS, stamped by a Professional Engineer licensed in the State of Nevada, that will: (1) bring the GWTS effluent into compliance with select Federal and State Primary Drinking Water Standards according to the attached UIC Sample Lists (#5,6,7,8,9,10, and 11); (2) ensure containment of the plume of contaminants, and (3) ensure that treated groundwater will not pond in or near the trenches.

By May 3, 2007, submit a Contingency Plan to address capture, treatment and disposition of contaminated water, and submit an Operation and Maintenance (O&M) Manual, both stamped by a Professional Engineer licensed in the State of Nevada. These documents shall contain two signature lines for BCA and the UIC Program to indicate the concurrence of the Bureaus.

By August 3, 2007, the GWTS effluent must meet the select Federal and State Primary Drinking Water Standards, State Action Levels, and the lower of (1) the USEPA Region IX Drinking Water Health Advisory Levels (chronic) **or** (2) the USEPA Region IX Preliminary Remediation Goals (PRGs) for Tap Water according to the attached UIC Sample Lists (5,6,7,8,9,10, and 11).

The Administrator may, upon the request of the Permittee, and after public notice, revise or modify a schedule of compliance in an issued permit if he determines good and valid cause (such as a strike, materials shortage or other event over which the Permittee has little or no control) exists for such revision.

B. Synopsis

December 1983: Consent Order

November 2006: Temporary UIC Permit Issued

The GWTS has been operational since December 1983. The GWTS is operated under a Consent Order between the State of Nevada, Stauffer Chemical Company, and the Montrose Chemical Corporation of California (Montrose). The purpose of the GWTS is to extract and treat contaminated alluvial aquifer groundwater migrating northward from the former Stauffer and Montrose facilities located within the Pioneer property at the Black Mountain Industrial Center.

Montrose operated an organic chemical manufacturing plant from about 1947 to 1983 producing a variety of organic chemicals and byproducts including chlorobenzene, polychlorinated benzenes, chloral, dichlorobenzil, hydrochloric acid (HCl), and ethyl chloride. In 1954 Montrose built a synthetic hydrochloric acid plant on the same property. Operations included the use of waste water evaporation ponds which received waste acid streams. From 1947 to 1976, process effluent from Montrose operations and storm water runoff were discharged to Stauffer's industrial sewer system. This system included a series of evaporation ponds connected by process piping and surface drainage ditches. Montrose dismantled the organic chemical manufacturing plant in 1983. Montrose continued HCl manufacturing operations until 1985 when the plant was leased to Pioneer Chlor-Alkali Company. In 1997, Pioneer purchased the HCl plant and continues to operate the plant today.

Stauffer operated a chemical manufacturing plant from about 1945 to 1988 producing a variety of chemicals including chlorine, sodium hydroxide, hydrochloric acid, and the following pesticides and herbicides: Trithion, Imidan, parathion, thiophenol, and γ -BHC (Lindane). Operations at the Stauffer facility generated various waste streams including aqueous organic waste, caustic water, byproducts from the production of pesticide products, phosphoric acid, and chlorine cell waste material. The former Stauffer facility was purchased by the Pioneer Chlor-Alkali Company in 1988 and is currently used for the production of liquid chlorine, caustic soda, hydrochloric acid, and bleach.

The GWTS currently consists of thirteen extraction wells, a multi-bag pre-filter, biocide and sequestering agent injection, a shallow tray air stripper, a 10,000 gal. equalization tank, two 5,000 lb. Liquid-Phase Granular Activated Carbon (LGAC) vessels in series, a post multi-bag filter, and three injection trenches (there is metering to each trench). In addition, there is a dedicated carbon vessel backwash system that allows the operator to backwash a single carbon vessel and continue GWTS operation at the same time. The GWTS has a complete control panel with a programmable logic controller (PLC) and supervisory control and data acquisition system (SCADA) with remote access capability.

The GWTS is designed to operate at a flow rate of approximately 250 gpm. In October 2006, the two LGAC vessels replaced six temporary carbon beds. The six carbon beds may be used for well head pretreatment. In the future, when the LGAC vessels are installed or repaired, the required samples shall be collected within eight (8) hours of the change out. Note that the air stripper was out of operation during April and May 2006. The GWTS is designed with an air stripper bypass to allow continued operation in the event the air stripper shuts down due to an alarm.

The extraction wells are 100-300 ft. apart and it has not been demonstrated to the Bureau of Corrective Actions that the cones of depression overlap which is required by the 1983 Consent Order as proof of the effectiveness of the intercept system. This line of extraction wells is parallel to the line of injection trenches and is approximately 100-175 ft. apart. The extraction wells are 4-8" in diameter, 45-65 ft. deep and pump 5-70 gpm. Depth to groundwater is currently 25-43 ft. bgs for all

wells, and the bottom of the first water bearing zone extends to approximately 70 ft. bgs. The injection trenches have 3-4" pipe that is 6-8 ½ ft. bgs. Risers (8 ½ ft. bgs) and/or piezometers (18 ½ - 20 ft. bgs) are located at each trench to measure water levels.

No more than 250 gpm of effluent from the GWTS (treated extracted groundwater) shall be injected into the authorized trenches. Additional effluent may be injected if approval is provided by the Division. Injection is by gravity flow and shall not exceed 30 psi.

The biocide MBI-8156 and sequestering agents AN-240 and AN-400 are authorized to be used as part of the existing treatment process. The majority of the biocide sorbs to the granular activated carbon and is held in place until it degrades. The sequestering agents are food-grade products that are added to control scaling, hardness, salts, iron and manganese metal oxides. The Companies report that the biocide and sequestering agents are likely contained within or degraded by the treatment system, and all of the products are biodegradable. No other chemical additives shall be added to the groundwater prior to injection or disposal without prior written approval by the Division. The maximum daily injection volume for the existing system is:

- i. biocide MBI-8156: 6 gal (every eight hours the duration of each injection is 30-45 min. at a rate of 1.7 gal/hr to ensure that the biocide concentration is approximately 100 ppm);
- ii. sequestering agent AN-240: 4 gal (the recommended starting dosage is 14 ppm); and
- iii. sequestering agent AN-40: 3 gal (the recommended starting dosage is 8 ppm).

There are two old trenches (Old West Trench and Old East Trench) that are no longer in use. These trenches must be plugged and abandoned according to State regulations; however, because the plugging of the entire trench would possibly interfere with the GWTS, the Division recommends at this time, that only the risers be plugged.

The Temporary UIC Permit will require analysis of approximately 300 additional compounds that are potential Contaminants of Concern (COCs) including VOCs, Semivolatile Organic Compounds (SVOCs), pesticides, PCBs, organic acids, Dioxins and Furans, metals and inorganic compounds.

According to the permit and the Schedule of Compliance, monitoring will be implemented to investigate the extent of contamination downgradient of the GWTS.

There are domestic, municipal water supply wells, public water supply systems, and gravel and borrow pits (presumably inactive) within the 1-mile radius (Area of Review) around the injection trenches. There are no faults within the area of review.

C. Receiving Water Characteristics

The GWTS is an active operating system that has operated for over 20 years. The Companies report that limited data is available for upgradient wells that would show the historic, background water quality data, and background data was not submitted.

Groundwater sampling at this site has demonstrated the presence of VOCs, SVOCs, pesticides, organic acids, metals, and other inorganic compounds. Groundwater in this region of Henderson is also known to contain perchlorate.

The information provided in the application discussed only the hydrogeology of the first water bearing zone in the Quaternary Alluvium and extending through upper portions of the Muddy Creek Formation. The second water bearing zone is being addressed separately by the Division and is currently under investigation. Injection of GWTS effluent should not impact this deeper zone where the aquifer is around 93-115 ft. The Quaternary Alluvium consists of shallow sands and gravels of alluvial origin deposited on the paleosurface of the Muddy Creek Formation. The Muddy Creek Formation consists of fine-grained lacustrine facies dominated by silts and clays, but also includes sand layers and lenses. The unconfined aquifer in the Quaternary Alluvium appears to be perched upon the Muddy Creek Formation and typically ranges from 10-25 ft. in thickness.

The general direction of groundwater flow is northeast towards the Las Vegas Wash. The regional hydraulic gradient is approximately 0.01 to 0.02. Constant rate pump tests conducted in 1982 showed the transmissivity ranged from 10,000 to 23,000 gpd/ft. Hydraulic conductivity was estimated at approximately 110 to 230 ft/d. Based on the hydraulic gradient in the area which ranged from 0.005 to 0.01, the Darcy velocity was estimated at approximately 0.5 to 3 ft/d.

In accordance with the Schedule of Compliance, at no time shall the injectate exceed select Federal Primary Drinking Water Standards and State Action Levels listed in UIC Sample List 5,6,7,8,9,10, and 11 as described by the limitations in this permit. Pursuant to NAC 445A.8585, if a maximum contaminant level (MCL) has not been established for a contaminant, a concentration level for the contaminant may be established by using an appropriate level of concentration based on the protection of public health and safety and the environment. The lower of (1) USEPA Region 9 Drinking Water Health Advisories Level (chronic) from February 2004, or (2) USEPA Region 9 Preliminary Remediation Goals (PRGs) for Tap Water from October 2004 shall be used as State Action Levels when a MCL has not been established.

The groundwater quality at this site since August 2003 has demonstrated the following concentrations above Primary and Secondary Drinking Water Standards and State Action Levels. Some Contaminants of Concern (COCs) have not yet been analyzed in the groundwater at the site. Note that the analysis of any samples that were composited for VOCs is considered to be unusable due to the potential for volatilization of compounds prior to lab analysis.

EXISTING GROUNDWATER CONCENTRATIONS (GWTS Influent & Monitoring Well Data since August 2003)

Constituent	Existing Groundwater Concentration	State and Federal Limit
α -BHC	0.0001 ppm – 0.080 ppm	0.000011 ppm ***
β -BHC	0.002 ppm – 0.035 ppm	0.000037 ppm ***
γ -BHC (Lindane)	<0.00005 ppm – 0.0044 ppm	0.0002 ppm
Benzene	<0.001 ppm – 20.40 ppm	0.005 ppm
Chlorobenzene or Monochlorobenzene	<0.001 ppm – 130.0 ppm	0.100 ppm
<i>p</i> -Chlorobenzenesulfonic acid (4-)	<0.100 ppm – 41.0 ppm	25.0 ppm ****
Chloroform	0.830 ppm – 120.0 ppm	0.080* ppm
2-Chlorophenol	<0.010 ppm – 0.310 ppm	0.040 ppm **; 0.030 ppm ***
1,3-Dichlorobenzene	<0.001 ppm – 1.170 ppm	0.600 ppm **; 0.180 ppm ***
1,4-Dichlorobenzene	<0.001 ppm – 1.470 ppm	0.075 ppm
1,2-Dichlorobenzene	<0.001 ppm – 0.881 ppm	0.370 ppm ***
1,2-Dichloroethane	<0.001 ppm – 0.230 ppm	0.005
Tetrachloroethene	<0.001 ppm – 0.091 ppm	0.005
1,2,4-Trichlorobenzene	<0.002 ppm – 0.326 ppm	0.0072 ppm ***
Trichloroethene	<0.001 ppm – 0.070 ppm	0.005 ppm
Total Dissolved Solids	2,800 ppm – 19,000 ppm	TDS may not exceed 1,900 mg/L (per NAC 445A.199)
Chloride	920 ppm – 15,000 ppm	400 ppm
Sulfate	860 ppm – 3,800 ppm	500 ppm
Nitrate (as Nitrogen)	<0.25 ppm – 11 ppm	10 ppm
Iron	0.65 ppm - 3.6 ppm	0.6 ppm
Magnesium	67 ppm - 490 ppm	150 ppm

* This compound is one of the Total Trihalomethanes whose MCL is 0.080 mg/L.

** DW Health Advisories (chronic) are from USEPA Region 9, Drinking Water Standards and Health Advisories Table, February 2004.

*** Preliminary Remediation Goals (PRGs) for tap water are from USEPA Region 9, October 2004.

****EPA Proposed injection limit for Montrose superfund site, California

Some COCs have not been analyzed yet in the groundwater at the site. Since 2005, the **GWTS effluent** has demonstrated the following maximum concentrations above Primary and Secondary Drinking Water Standards and State Action Levels. Note that the analysis of any samples that were composited for VOCs is considered unusable due to the potential for volatilization of compounds prior to lab analysis.

GWTS EFFLUENT (since 2005)

Constituent	GWTS Effluent Maximum Concentration	State and Federal Limit
Aldrin	0.000089 ppm	0.000002 ppm **; 0.000004 ppm***
Arsenic	0.130 ppm	0.010 ppm
α -BHC	0.00017 ppm	0.000011 ppm ***
β -BHC	0.00014 ppm	0.000037 ppm ***
Benzene	0.081 ppm	0.005 ppm
Chloride	5,100 ppm	400 ppm
Chloroform	0.659 ppm	0.080* ppm
Magnesium	280 ppm	150 ppm
Manganese	0.620 ppm	0.100 ppm
Sulfate	1,800 ppm	500 ppm
Total Dissolved Solids	12,000 ppm	TDS may not exceed 1,900 mg/L (per NAC 445A.199)

* This compound is one of the Total Trihalomethanes whose MCL is 0.080 mg/L.

** DW Health Advisories (chronic) are from USEPA Region 9, Drinking Water Standards and Health Advisories Table, February 2004.

*** Preliminary Remediation Goals (PRGs) for tap water are from USEPA Region 9, October 2004.

D. Procedures for Public Comment

Notice of the Division's intent to issue a UIC permit authorizing the facility to inject into the groundwater of the State of Nevada was sent to the Las Vegas Review Journal and/or Las Vegas Sun, and the Henderson Home News. The notice was mailed to interested persons on our mailing list. Anyone wishing to comment on the proposed permit can do so in writing for a period of 30 days following the publication date of the said public notice. The comment period can be extended at the discretion of the Administrator. All written comments received during the comment period will be retained and considered in the final determination.

A public hearing on the proposed determination can be requested by the applicant, any affected state, any affected interstate agency, the regional administrator of EPA Region IX or any interested agency, person or group of persons.

Any public hearing determined by the Administrator to be held must be conducted in the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings will be conducted in accordance with NAC 445A.238.

The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445A.605.

E. Proposed Determination

The Division has made the tentative determination to issue the proposed permit for a five-year period.

F. Proposed Limitations and Special Conditions

TABLE 1

PARAMETER	FREQUENCY	LOCATION	LIMITATIONS
All chemicals on the following UIC Sample Lists: 5,6,7,8,9,10, and 11 (see attachments to permit) ¹	Weekly for first three weeks (7 day lab turnaround), then Monthly thereafter, and	(a) Discharge pipe at end of treatment and prior to injection into the three injection trenches (Effluent), (b) Trip Blank, and (c) Two downgradient and one upgradient compliance monitoring transects concurred with by BCA and the UIC Program.	According to the Schedule of Compliance, each parameter must not exceed Federal and State Primary and Secondary Drinking Water Standards or Action Levels (where applicable). TDS may not exceed 1,900 mg/L (per NAC 445A.199). The lowest value of the: (1) USEPA Region 9 Drinking Water Health Advisories level or (2) Preliminary Remediation Goals for Tap Water shall be used as Action Levels when there is not a Drinking Water Standard.
All chemicals on the following UIC Sample Lists: 5,6,7,8,9,10, and 11 (see attachments to permit) ¹	Within 8 hours of when the system goes on-line following a system shut-down due to non-performance, then daily for two days, weekly for three weeks, then monthly thereafter. ²	Discharge pipe at end of treatment and prior to injection into the three injection trenches (Effluent)	According to the Schedule of Compliance, each parameter must not exceed Federal and State Primary and Secondary Drinking Water Standards or Action Levels (where applicable). TDS may not exceed 1,900 mg/L (per NAC 445A.199). The lowest value of the: (1) USEPA Region 9 Drinking Water Health Advisories level or (2) Preliminary Remediation Goals for Tap Water shall be used as Action Levels when there is not a Drinking Water Standard.

TABLE 1 (continued)

--	--	--	--

All chemicals on the following UIC Sample Lists: 5,6,7,8,9,10, and 11 (see attachments to permit) ¹	Weekly for first three weeks (7 day lab turnaround), and then Monthly thereafter ²	Influent pipe to the GWTS (prior to treatment)	Monitor and Report
Injection Rate and Volume to each trench	Continuously	Discharge pipe at the end of treatment and prior to injection into the three injection trenches (Effluent)	Combined maximum of 250 gallons per minute (gpm). Monitor and Report average injection rate (gal/day) and daily volume to each trench.
Depth to Groundwater and Groundwater Elevation (amsl)	Quarterly	Two downgradient and one upgradient compliance monitoring transects concurred with by BCA and the UIC Program.	All reported values shall be measured. Estimations are not allowed.

¹ Should there be detection of any parameter not listed in Table 1 by the laboratory analyzing samples, results of these analyses MUST be reported to the Division within thirty (30) days of sampling.

² When system goes on-line following a system shut-down due to non-performance, **an effluent sample shall be taken within 8 hours of when the system goes on-line and daily for two more days with 48 hour laboratory turnaround/reporting**, weekly for three weeks with 5 day laboratory turnaround/reporting, and monthly thereafter with quarterly reporting.

G. Rationale for Permit Requirements

The permit conditions will help to ensure that the injectate does not adversely affect the existing water quality or hydrologic regime.

Prepared by: Becky E. Linvill
Date: November 3, 2006